REMARKS

Claims 1-11, 14, 15 and 17-31 are active in the present application. Reconsideration is respectfully requested.

The present invention relates to a polymerizable, solid aliphatic polyurethane that contains olefinically unsaturated double bonds.

Claim Amendments

Claim 1 has been amended in several places to aid in clarifying the meaning of the claim. In particular, the amendment to step two of each of Process embodiments A and B, which states that the polyurethane of the invention contains terminal and/or lateral olefinically unsaturated double bonds, is supported by the disclosure of the text at page 4, lines 25-28. Further, the product of step one of Process A is further limited by the phraseology of "consisting of" in defining adduct of A) and C), while the language of step one of Process embodiment B is also limited by use of the phraseology of "consisting of". Since the amendments made to Claim 1 only further narrow the claim, it is believed that the amendments do not raise issues after the final action and entry of the amendments is respectfully requested.

Claim Rejection, 35 USC 112

The rejection of Claims 12 and 29 has been obviated by the amendment made to each claim whereby the dependency of each claim has been changed to Claim 1. Withdrawal of the rejection is respectfully requested.

Invention

The present invention is directed to a polymerizable solid aliphatic polyurethane containing one or more olefinically unsaturated double bonds. The polyurethane contains olefinically unsaturated double bonds and has a very narrow melting range within the temperature range from 40 to 200°C. The polyurethane is prepared by one of two processes (A) or (B). Process (A) involves (i) reacting at least one linear aliphatic diisocyanate A) with at least one olefinically unsaturated compound C) having an isocyanate reactive group in a molar ratio A):C) of 1:1 to give a product consisting of adduct A/C) containing one isocyanate group and one olefinically unsaturated group, and then (ii) reacting the adduct A/C) with at least one aliphatic compound B) containing at least two isocyanate-reactive functional groups and/or water in a molar ratio A/C):B) of x:1, wherein x is the number of the isocyanate-reactive groups in the at least one compound B), to give the aliphatic polyurethane.

Process (B) involves (i) reacting at least one linear aliphatic diisocyanate A) with at least one aliphatic compound B) containing at least two isocyanate-reactive functional groups and/or water in a molar ratio A):B) of x:1, wherein x is the number of the isocyanate-reactive

groups in the at least one compound B) to give a product consisting of adduct A/B) containing only x terminal isocyanate groups, and then (ii) reacting the adduct A/B) is reacted with at least one olefinically unsaturated compound C) containing an isocyanate-reactive functional group in a molar ratio C):A/B) of x:1, wherein x is the number of the isocyanate groups in the adduct A/B) to give the aliphatic polyurethane.

The polymerizable solid aliphatic polyurethane containing one or more olefinically unsaturated double bonds of the invention is characterized by having a very desirable narrow melting point range within the range of 40 to 200° C that can be used as a powder coating material or for preparing powder coating materials which give weathering-stable and non-yellowing coatings.

Applicants direct the attention of the Examiner to the two attached sheets, one of which provides a depiction of the two steps of the embodiment of Process A while the other sheet provides a depiction of the two steps of the embodiment of Process B.

Prior Art Rejection

Claims 1-11, 14, 15, 17-19, 21, 23 and 26-31 stand rejected based on 35 USC 102(a) or 35 USC 103(a) as anticipated by or rendered obvious over Bayards WO 99/14254. This ground of rejection is respectfully traversed.

The Bayards reference discloses a radiation-curable binder composition for powder paint formulations that is said to be formulated from a combination of a polymer having specified unsaturation and a crosslinker. In a preferred embodiment of the cross-linker of the

reference, as described on page 9 of the test, the cross-linker is obtained by reacting a hydroxy-functional prepolymer, a (poly)isocyanate and a vinyl ether or an unsaturated alcohol. Experiment 3 of the reference has been deemed as particularly illustrative of such a process that is believed by the Examiner to be particularly relevant to the claimed process of Claim 1 of the present invention, because it describes a crosslinker that is prepared by reacting a crystalline prepolyester, prepared by the reaction of ethylene glycol and dodecanedicarboxylic acid reactants, with 1,6-hexamethylene diisocyanate and hydroxybutylvinyl ether, each in an amount of about 0.25 moles. Accordingly, because the process of the example requires the reaction of the 1,6-hexamethylene diisocyanate and hydroxybutylvinyl ether in the presence of the prepolyester, it is clear that the material obtained as a product contains several species because the HMDI us reacting with two different hydroxyl group bearing compounds which are hydroxy butylvinyl ether and the prepolyester. (One such product easily envisioned is a product of the reaction of one of the isocyanate groups of the HMDI with the hydroxy group of a molecule of hydroxybutylvinyl ether and the reaction of the remaining isocyanate group with a hydroxy group of a molecule of prepolyester. Such a product is precluded from the first step of Process A of the invention by the language of Claim 1.) Thus, the process of the example is completely different from the Process (A) embodiment of the present invention, where, in the first step as shown in the example of Process A on the attached sheet, 1 mole of diisocyanate is reacted with a 1 mole hydroxyvinyl compound to form a product consisting of 1 mole of intermediate urethane compound having a terminal isocyanate group and a terminal vinyl group, and then, in a

concluding second step, the product (2 moles thereof) of the first step is reacted with a diol (1 mole) in the depiction to form 1 mole of polyurethane product having terminal and/or lateral olefinically unsaturated double bonds. It is quite apparent that the reference does not disclose a counterpart to the first step of Process embodiment A of the present claims in which a urethane compound is formed that contains one each of an isocyanate group and a vinyl group. The reference therefore does not obviate Process A of the present claims.

As to the embodiment of Process B of the invention, this embodiment of the invention is not the same as the process of Experiment III of the reference. A first difficulty with the disclosure of Example III is that the amount of prepolyester of the Example is not given. This is significant because the amount of the prepolyester would be an important factor in the component make-up of the eventual polyurethane product obtained. Thus, it is not possible for it to be deduced that by practicing the process of Experiment III, that the process of Process B would be replicated. Another significant difference is that, whereas the process of Experiment III requires the reaction between diisocyanate and hydroxybutyl vinyl ether in the presence of prepolyester, such is not the first step of Process B of the present claims where only one mole of a diol, such as a prepolyester, is reacted with the diisocyanate with no hydroxyvinyl compound being present. The language of Process B embodiment of the invention excludes the presence of reactant (C) in the first step which means that the only product formed in the first step is by the reaction of isocyanate groups of the diisocyanate reactant with the hydroxy groups of the prepolyester. (See the sheet attached to the response which shows the two reactions of Process B.) As noted above, while an easily envisioned

product of the single stage reaction of Experiment III is a product of the reaction of one of the isocyanate groups of the HMDI with the hydroxy group of a molecule of hydroxybutylvinyl ether and the reaction of the remaining isocyanate group with a hydroxy group of a molecule of prepolyester, such a product is precluded from the first step of Process B of the invention by the language of Claim 1. Accordingly, the only product formed in the first step of Process (B) of the invention is a urethane material that contains, as active groups, only isocyanate groups. This clearly is not the situation in the process of Experiment III of the reference. Accordingly, the Bayards reference neither anticipates nor obviates the present invention as claimed. Withdrawal of the rejection is respectfully requested.

Claims 24 and 25 stand rejected based on 35 USC 103(a) as obvious over Bayards WO 99/14254 in view of Hall WO '332. This ground of rejection is respectfully traversed.

Although it is clear from the description of the Hall reference of the paragraph bridging pages 2 and 3 that a powdered ethylenically unsaturated material having a melting point of about 60° to 120° C is prepared by reacting a polyisocyanate with an at least stoichiometric amount of an alcoholic component comprising at least a monovalent alcohol, a portion of which possesses ethylenic unsaturation derived from acrylic acid or methacrylic acid and optionally at least a monomeric polyol, nevertheless, the reference does not provide any teaching of the amounts of reactants employed, and certainly contains no disclosure of the specific limitations of present Claim 1. The reference contains no teaching that, upon combination with the disclosure of Bayards, brings the prior art closer to the process aspects of the present invention. In fact, when calculating the amounts of reactants employed in the

examples of the reference, it is clear that the products obtained do not correspond to the polyurethane of the present invention. Thus, the Hall reference does not overcome or improve upon the deficiencies of the Bayards reference. Accordingly, withdrawal of the obviousness ground of rejection is respectfully requested.

Claims 20, 22 and 23 stand rejected based on 35 USC 103(a) as obvious over Bayards WO 99/14254 in view of Sacharski et al. This ground of rejection is respectfully traversed.

The c patent is of secondary interest, because it contains no disclosure of relevance to the two process aspects of the present invention by which the distinctly different polymerizable solid aliphatic polyurethane containing one or more unsaturated bonds is prepared. Accordingly, because the present polymerizable solid aliphatic polyurethane is not shown or suggested by the Bayards reference and because the Sacharski et al does not overcome of improve upon the deficiencies of Bayards relative to the polyurethane product of the invention, the combined references do not obviate the indicated claims which are entirely dependent upon the polymerizable solid aliphatic polyurethane of the present invention. Claims 20, 22 and 23 are therefore patentable over the disclosures of the combined references and withdrawal of the obviousness ground of rejection is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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